Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	}	
	}	
Revision of Part 15 of the Commission's	}	
Rules Regarding Ultra-Wideband	}	ET Docket No. 98-153
Transmission Systems	}	

Reply Comments of Multispectral Solutions, Inc.

Multispectral Solutions, Inc. (MSSI) is pleased to submit these further reply comments in response to the Notice of Proposed Rule Making (NPRM), FCC 00-163, in the above referenced proceeding.

Throughout the course of this proceeding, MSSI has worked closely with a number of commercial, Government and military organizations in an effort to more fully understand the implications of using ultra wideband (UWB) technology on an unlicensed basis under Part 15 of the Commission's rules. With more than 12 years of experience in the design, development, implementation and fielding of UWB equipment for the Government and military, representing more than 50 UWB system development efforts to date, MSSI is in an unique position to provide educated comment on this technology.

The regulatory issues involved with UWB are both unique and complex. Despite the claims made by some UWB proponents that "UWB is just like other Part 15 devices"; existing Part 15 devices do not intentionally radiate in §15.205 restricted bands, whereas UWB devices often need to straddle such bands because of their large spectral occupancy. Therein lies the dilemma, but also an unique opportunity for the FCC to position the U.S. to rapidly accommodate new and promising wireless technologies.

In previous submissions to this docket, MSSI has attempted to outline an approach for introducing UWB technology into the commercial sector without significant impact to critical safety-of-flight, safety-of-life and other commercial wireless services. Here it should be pointed out that UWB, like any RF technology, has the potential to interfere with existing systems; but through good engineering practice (as quantified by numerous submissions to this proceeding), such interference can be minimized and reduced to below acceptable thresholds. As pointed out by numerous respondents, "good engineering practice" includes filtering of out of band emissions (OOBE), where the definition of OOBE takes into proper account the effect on other wireless services.

In its 22 March 2001 submission to the Commission, MSSI provided a suggested set of revisions to 47 CFR Section 15 to permit the unlicensed use of ultra-wideband (UWB) devices. The suggested wording reflected MSSI's then current understanding of the interference effects of UWB emissions operating in bands below 3.1 GHz as reflected in extensive test and measurement data from the National Telecommunications and Information Administration

(NTIA)[1,2], Stanford University/DOT[3] and the Johns Hopkins University/Applied Physics Laboratory[4].

In this submission, we further refine the proposed hypothetical 47 CFR "Section 15.5" and "Subpart F" for unlicensed Ultra-Wideband Devices (UWB). This refinement takes into account the most recent test data and suggestions provided to the FCC under ET 98-153. As before, much of the proposed regulations mirror those currently in place for unlicensed National Information Infrastructure (U-NII) devices under 47 CFR Subpart E. The major changes from MSSI's 22 March 2001 submission relate to instantaneous bandwidth, average power limits and specific operational constraints in the 3.1 to 5.46 GHz region relating to the use of high pulse repetition frequency (PRF) devices.

It is MSSI's understanding that the Commission is reluctant to consider the issuance of a Further Notice of Proposed Rule Making (FNPRM) prior to the release of a final Report and Order in this proceeding. Thus, it is even more imperative that detailed recommendations for Part 15 modification, as represented by this submission, be entered into the record for comment by all interested parties.

Respectfully submitted,

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[1] "The Temporal and Spectral Characteristics of Ultrawideband Signals," William A. Kissick, editor, NTIA Report 01-383, January 2001 (http://www.its.bldrdoc.gov/pub/ntia-rpt/01-383/). "Assessment of Compatibility Between Ultrawideband Devices and Selected Federal Systems," Brunson, L.K. et al., NTIA Special Publication 01-43, January 2001 (http://www.ntia.doc.gov/osmhome/reports/uwb/uwb.pdf).

[2] David S. Anderson, Edward F. Drocella, Steven K. Jones and Mark A. Settle, "Assessment of Compatibility between Ultrawideband (UWB) Systems and Global Positioning Systems (GPS) Receivers", NTIA SPECIAL PUBLICATION 01-45, February 2001. J. Randy Hoffman, Michael G. Cotton, Robert J. Achatz, Richard N. Statz and Roger A. Dalke, "Measurements to Determine Potential Interference to GPS Receivers from Ultrawideband Transmission Systems", NTIA REPORT 01-384, February 2001.

[3] "Potential Interference to GPS from UWB Transmitters, Test Results. Phase 1A: Accuracy and Loss-of-Lock testing for Aviation Receivers," M. Luo, D. Akos, S. Pullen and P.Enge, Stanford University, 26 October 2000.

[4] "Final Report, UWB-GPS Compatibility Analysis Project," The Johns Hopkins University/Applied Physics Laboratory, 8 March 2001.

Subpart F - Ultra-Wideband Devices
(Proposed – Revised 3 August 2001)

Section 15.501 Scope.

This subpart sets out regulations for unlicensed Ultra-Wideband (UWB) devices operating in the frequency range above 3.1 GHz.

Section 15.503 Definitions.

(a) Short pulse modulation. A short pulse modulation is one which consists of narrow, short duration, pulses and in which the emission bandwidth is directly related to the narrow pulse width. Specifically excluded from this definition are direct sequence and frequency hopping spread spectrum, linear and nonlinear FM chirp, and other such modulations in which the signal envelope does not directly relate to the emission bandwidth.

(b) Emission bandwidth. For purposes of this subpart, the emission bandwidth shall be the difference (f_H-f_L), where f_H is the upper frequency of the -10 dB emission point and f_L is the lower frequency of the -10 dB emission point.

(c) Pulse repetition frequency. The pulse repetition frequency, or PRF, of an emission is defined as the peak pulse rate as measured in any 0.1 second interval; i.e., (# pulses emitted in 0.1 second interval)/(0.1 seconds).

(d) UWB devices. Intentional radiators operating in the frequency bands above 3.1 GHz that use short pulse modulation and have an emission bandwidth greater than 500 MHz.

Section 15.505 Cross reference.

(a) The provisions of Subparts A, B, and C of this part apply to unlicensed UWB devices, except where specific provisions are contained in subpart F. Manufacturers should note that this includes the provisions of Section 15.203, but does not include the provisions of Section 15.205 in the frequency range above 3.1 GHz.

(b) The requirements of subpart F apply only to the radio transmitter contained in the UWB device. Other aspects of the operation of a UWB device may be subject to requirements contained elsewhere in this chapter. In particular, a UWB device that includes digital circuitry not directly associated with the radio transmitter also is subject to the requirements for unintentional radiators in subpart B.

Section 15.507 General technical requirements.

(a) Radiated Emission Limits:

(1) Except as provided elsewhere in this Subpart, the emissions from a UWB device shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 3,100	1.58 (-91.25 dBm/MHz)	3
Above 3,100	500 (-41.25 dBm/MHz)	3

(2) In the emission table above, the tighter limit applies at the band edge.

(3) Radiation emission limits are based on measurements employing an average detector and a minimum resolution bandwidth of 1 MHz.

(4) The provisions in Section 15.31 for measuring emissions at distances other than the distances specified in the above table apply to all devices operated under this part.

(b) Pulse Repetition Frequency Limits:

(1) A UWB emission shall be considered to be operating within the 3.1 to 5.46 GHz frequency range if the measured field strength in that frequency range exceeds the lower limit (1.58 microvolts per meter at 3 meters) in the table in 15.507(a)(1).

(2) The pulse repetition frequency of any UWB emission operating in the frequency range from 3.1 to 5.46 GHz shall not exceed 20 Mpps (20 million pulses per second).

(3) Except for limitations imposed by 15.507(a)(1) above, no pulse repetition frequency limit shall be mandated above 5.46 GHz.

(c) Undesirable Emission Limits:

(1) Any UWB devices using an AC power line are required to comply also with the conducted limits set forth in Section 15.207.

(2) The provisions of Section 15.205 of this part do not apply to intentional radiators operating under this section.

(3) The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

(4) UWB devices are subject to the radio frequency radiation exposure requirements specified in § 1.1307(b), § 2.1091 and § 2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

(5) Manufacturers of UWB devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.